

## Ch 10 Review

## 10.1 Exponential Functions

- graphs
- write equations
- change base

$$y = a \cdot b^x$$

$$2^x = 8$$

## 10.2 Logarithmic and Exponential forms

- switching between the forms
- inverse properties

$$8^{\log_8 5} = 5$$

$$\log_2 9 = 2$$

## 10.3 Properties of Logs

- +  $x$   $\log(5x) = \log 5 + \log x$
- $\div$  -
- power rule  $\log_b a = \log_{10} b$

## 10.4 Common Logs

- change of base formula
- word problems, pH,  $I_0$ , richter

$$\text{ex } \log_2 10 = \frac{\log 10}{\log 2} = 3.3219$$

## 10.5 e &amp; ln

- Compound continuously

$$A = Pe^{rt}$$

$$\text{Interest } A = P \left(1 + \frac{r}{n}\right)^{nt}$$

## 10.6 Growth and Decay

- word

$$y = a(1 \pm r)^t$$

$$y = a \cdot e^{\pm kt}$$

$$\log_5 7 = \frac{\log(7)}{\log(5)}$$

$$\log_{12} 13 = \frac{\log 13}{\log 12} =$$

## Review problems

p571

#s 1-8, 11, 12, 13-27 odd, 28, 29

p570

#s 63-65

p568

#s 24-27

$$5 = e^x$$

$$\ln 5 = x$$

$$\frac{\log(5)}{\log(e)} = x \log e$$

Choose the term that best completes each sentence.

- 1. The equation  $y = 0.3(4)^x$  is an exponential (*growth, decay*) function.
- 2. The logarithm of a quotient is the (*sum, difference*) of the logarithms of the numerator and the denominator.
- 3. The base of a natural logarithm is (*10, e*).

Skills and Applications

- 4. Write  $3^7 = 2187$  in logarithmic form.
- 5. Write  $\log_8 16 = \frac{4}{3}$  in exponential form.
- 6. Write an exponential function whose graph passes through (0, 0.4) and (2, 6.4).
- 7. Express  $\log_5 5$  in terms of common logarithms.
- 8. Evaluate  $\log_2 \frac{1}{32}$ .

Simplify each expression.

- 11.  $(\sqrt[3]{9})\sqrt{2}$
- 12.  $81^{\sqrt{5}} \div 3^{\sqrt{5}}$

Solve each equation or inequality. Round to four decimal places if necessary.

odds

- 13.  $2^x - 3 = \frac{1}{16}$
- 14.  $27^{2p+1} = 3^{4p-1}$
- 15.  $\log_2 x < 7$
- 16.  $\log_m 144 = -2$
- 17.  $\log_3 x - 2 \log_3 2 = 3 \log_3 3$
- 18.  $\log_9 (x+4) + \log_9 (x-4) = 1$
- 19.  $\log_5 (8y-7) = \log_5 (y^2+5)$
- 20.  $\log_3 3^{(4x-1)} = 15$
- 21.  $7.6^{x-1} = 431$
- 22.  $\log_2 5 + \frac{1}{3} \log_2 27 = \log_2 x$
- 23.  $3^x = 5^{x-1}$
- 24.  $4^{2x-3} = 9^{x+3}$
- 25.  $e^{3y} > 6$
- 26.  $2e^{3x} + 5 = 11$
- 27.  $\ln 3x - \ln 15 = 2$

COINS For Exercises 28 and 29, use the following information.

You buy a commemorative coin for \$25. The value of the coin increases 3.25% per year.

- 28. How much will the coin be worth in 15 years?
- 29. After how many years will the coin have doubled in value?

- 63. **BIOLOGY** For a certain strain of bacteria,  $k$  is 0.872 when  $t$  is measured in days. How long will it take 9 bacteria to increase to 738 bacteria?
- 64. **CHEMISTRY** Radium-226 decomposes radioactively. Its half-life, the time it takes for half of the sample to decompose, is 1800 years. Find the constant  $k$  in the decay formula for this compound.
- 65. **POPULATION** The population of a city 10 years ago was 45,600. Since then, the population has increased at a steady rate each year. If the population is currently 64,800, find the annual rate of growth for this city.

Evaluate each expression. See Examples 3 and 4 on pages 532 and 533.

- 24.  $4^{\log_4 9}$
- 25.  $\log_7 7^{-5}$
- 26.  $\log_{81} 3$
- 27.  $\log_{13} 169$